G. Sundlöf
PNEUMATICALLY OPERATED LOG CARRIAGE
AND CONTROLS THEREFOR

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The present invention relates to improvements in fluid pressure operated apparatus of the type including a plurality of servo-motors for transmitting power.

More particularly this invention relates to an improved pneumatically actuated log carriage and to the controls therefor.

The invention further relates to a log carriage of the type used in connection with frame saws, particularly for feeding logs into frame saws. Log carriages of this type include log gripping means comprising jaws or claws that are movable toward and away from one another to hold a log on the carriage, mechanism for turning the gripping means about an axis parallel to the direction of movement of the carriage and mechanism for shifting the gripping means laterally.

Accordingly the present invention has for a particular object the provision of improved fluid pressure actuated means for gripping a log, turning the gripping means; and side or laterally shifting the same.

A further object includes the provision of a log carriage of the aforementioned type in which a rapid and exact setting of the gripping means or claw unit is attained with respect to its angle of rotation and the distance of lateral movement.

More particularly and in connection with the aforementioned object, the invention aims to provide an improved control for the log carriage operative to fix the gripping means or claw unit in a proper or correct position so as to ensure a straight sawing of the log thereby preventing a change in the position of rotation or turning of the claw unit which change would result in a helical saw cut and further preventing a change in the lateral position of the unit, and which latter change would result in a curved saw cut.

It is a further object of the invention to provide pneumatically operated means for both setting the claw unit and for fixing the same and a control mechanism therefor operative to effect the fixing of the unit at the moment the setting thereof is completed.

It is an additional object of this invention to provide a centralized control arrangement for the claw unit and the means for setting and fixing the same.

Further and more specific objects will be apparent from the following description taken in connection with the accompanying drawings illustrating a preferred embodiment and in which:

Figure 1 is a side elevational view of the improved log carriage.

Figure 2 is a top plan view of the log carriage shown in Figure 1.

Figure 3 is an end elevational view as viewed from the right in Figure 1.

Figure 4 is a similar view as seen from the left in Figure 1.

Figure 5 is a fragmentary view on an enlarged scale and vertically in cross section and illustrating the means for supporting and operating the claw means.

Figure 6 is a fragmentary view partly in section illustrating the claw means as viewed from the front thereof.

Figure 7 is a fragmentary view partly in elevation and partly in cross section and illustrating some of the pneumatically operated means.

Figure 8 is a fragmentary end elevational view illustrating some of the structure shown in Figure 7 as viewed from the right.

Figure 9 is a fragmentary view partly in elevation and partly in horizontal cross section and illustrating the means for shifting the claw unit laterally.

Figure 10 is a similar view illustrating the means for shifting the claw unit laterally in vertical cross section.

In the drawings, the reference numeral 1 indicates the frame of the log carriage, said frame comprising wheels 2 running on rails 3. The log carriage frame further mounts chain wheels 2' which are in mesh with opposite moving haulage chains, not shown. Control means forming no part of this invention selectively locks one or the other of chain wheels 2' so that the haulage chains can selectively move the carriage towards or away from a saw frame, not shown. On the rear part of the frame an operator's seat 3 is securely mounted. Between and securely mounted in the side sections of the frame extends transverse shaft 4. On the central portion of the shaft 4 is provided a piston head 5, Figs. 5 and 10, either attached to the shaft or constituting an integral part of the same. The piston head 5 is enclosed in a cylinder 6. The cylinder 6 constitutes the supporting structure of a cross-frame which is movable along the shaft 4 and which includes the plates 7 formed on the ends of said cylinder, bracketed 8 and 9, and a plate 10, Figs. 5 and 9, which is securely mounted on the cylinder 6 and encloses a piston 11 having a piston rod 12 extending through the cylinder and having its ends attached to the side sections of the frame.

On the intermediate portion of a transverse beam 13 of the frame 1, Figs. 1, 5 and 9, a cylinder 14 is securely mounted. This cylinder 14 extends at right angles to the cylinder 6 and is open towards the same. The cylinder 14 encloses a piston 15 which extends approximately to the outside of the cylinder 6, viz., to the brake plate 60, and for braking purpose is forced towards the cylinder 6 by means of air under pressure supplied through the conduit 16 connected to the cylinder 14. The cylinder 6 has its opposite ends connected to conduits 17 and 18 for the supply and exhaust of air under pressure whereby the cylinder 6 may be moved along the shaft 4 in either direction thereby moving the claw unit laterally. The conduits 16, 17 and 18 are connected to a three-way valve 20, Figs. 1–4, for communication with the air-pressure distributing chamber 19, said valve having a handle 21 for controlling said conduits as will be described later.

The cylinder 10, Fig. 9, together with the associated piston 11 constitutes a dashpot device for damping the movement of the cylinder 6. To this effect the cylinder 10 is provided with a conduit 22 extending from one end of said cylinder to the other, the spaces enclosed by said conduit and the spaces within the cylinder on opposite sides of the piston 11 being filled with oil. The conduit 22 includes a valve 23 for controlling the flow of oil and thereby regulating the damping effect so that the speed of the lateral or shifting movement can be adjusted.

In the vertical brackets 8 of the cross-frame including...
the cylinder 6 as supporting structure, a transverse shaft 24, Figs. 1 and 5, is supported. On said shaft 24 is rock-ingly mounted a cylinder 25 having therein a piston 26 which is provided with a portion protruding from the rear open end of the cylinder 25, facing the driver’s seat 3. The portion of the piston protruding from the cylinder is hollow and houses a combined thrust and radial bearing 27 for a longitudinal shaft 28 constituting the control shaft for operating the claws 29 of the log carriage. The said shaft 28 is rotatable in the hollow piston 26 but held against longitudinal movement in the same. The end of the piston 26 supports a cover for protecting the bearings guided in a sleeve 30 provided within the cylinder 25 and constituting a part or sleeve of the same. Said cylinder part 30 has a forwardly projecting extension 31 constituting a bearing housing for rotatably mounting a claw bracket 33. The claw bracket 33 is provided with pivots 33 on which are mounted gripping claws or dogs 29. The claws are formed as ball crank levers and include suitable gripping surfaces on their front arms and pins 34 in the rear arms. The pins 34 engaging in radially extending slots 35 which are provided in a head 36 formed on the shaft 24. To the opposite ends of the cylinder 25 are connected two conduits 37, 38, which extend from the valve 39, Fig. 2, communicating with the air-pressure chamber 19 and provided with a handle 46. By means of said valve 39 either end of the piston 26 can be subject to the air pressure in the said chamber for moving the piston 26 and thereby the shaft 28 longitudinally in either direction, so that the claws 29 can be moved together or apart.

The cross-frame movable along the transverse shaft 4 as described, supports the engine 41 of a pneumatic motor, Fig. 5, and which casing is attached to the frame by any suitable means. This motor is of the rotary reversible type well-known in the art, and the shaft of the same imparts rotation or turning movement to the claw unit by means of a gearing 42 including an internal gear operatively connected with a piston 43 meshing with a gear 44 attached to the claw bracket 32.

The external circumferential surface of the external gear of the gearing 42 is engaged by two brake levers 45, Fig. 6, which are pivoted on rods 46 securely mounted in the cross-frame. Between the downwardly extending arms 47 of the brake levers is a brake motor, comprising a cylinder 48 connected with one arm 47, and a piston 49 connected with the other arm 47. Moreover, the arms 47 are interconnected by means of a tension spring 50 holding the brake levers out of engagement with said gearing when no braking shall occur.

The pneumatic motor 41 is connected to the air-pressure chamber 19 through a conduit 51 permanently open towards said chamber. The supply of air to the motor is controlled by the governor valve 52, Fig. 3. The valve 52 is operated from the handle 53 by means of a link 54, see also Figs. 2, 7 and 8. The same handle 53 operates also, through the link 55, a valve 56 for controlling the conduit 57 supplying air under pressure from the chamber 19 to the brake cylinder 46.

The air pressure or distributing chamber 59 distributes air under pressure to the conduit arrangements including the conduits 37, 38 feeding the pneumatic motors 25, 26, the conduit 51 feeding the pneumatic motor 41, and the conduits 17 and 18 feeding the pneumatic motors 5 and 6. Additionally air under pressure passes from the distributing conduit 15 and 16 feeding the associated pneumatic brake means 48, 49 and 14, 15 respectively. The distributing chamber is supplied with air under pressure through conduit 70, Figures 1 and 3, which receives air under pressure from a stationary compressor 76 shown diagrammatically in Figure 4. A flexible hose 74 communicates with the stationary piping line 75 fed by the compressor, and feeds air to conduit 71 which communicates with the interior of the pole 70 via a valve 73 and a short conduit 70'. An additional short conduit 80 communicates at one end with the pole 72 and at its other end with a valve 81 which in turn communicates with an outlet conduit 77. The outlet conduit 77 is for supplying air to pneumatic motors of separate stationary mechanisms, not shown. Thus, for instance, this outlet conduit supplies air for the motor of the feed-work of the frame saw or supplies air to the motor for the log kicker for transferring the logs onto ball 9' over the feed member 9'.

By means of the equipment described above the operator while remaining on his seat 3 can control the following three functions pneumatically by simple manipulations:

1. Operating the claws for gripping and clamping a log resting upon the ball 9';
2. Rotating the claw unit together with the log as clamped to a position corresponding to a setting position suitable for feeding the log into the frame saw and simultaneously fixing or locking the setting;
3. Moving the cross-frame transversely together with claw unit and log to a lateral or setting position suitable for feeding the log into the frame saw and simultaneously fixing or locking the setting.

In this specification the expression "forward" is used for a movement towards the claws and the expression "backward" is used for a movement towards the seat of the operator or driver. In similar way the expressions "front" and "rear" are used.

**Gripping operation**

For gripping the logs with the claws the driver has to turn the handle 40, for instance towards the right-hand side of the carriage in Fig. 2. Then, air under pressure will flow through the cylinder 19 through the valve 39 and the conduit 37 to the front end of the cylinder 25, moving the piston 26 together with the shaft 28 backwards. Thereby, the claws 29 are moved together, firmly clamping the log L. This firm grip is maintained as long as the air-pressure is acting upon the piston. When the handle 40 was operated towards the right-hand side, a connection from the rear end of the cylinder 25 to the atmosphere was opened in the valve 39. When the claws are to be moved to the open position the handle 40 is operated in the opposite direction, thus towards the left-hand side according to the example set forth above. Thereby, the air under pressure is caused to flow through the conduit 38 to the rear end of the cylinder 25, and simultaneously therewith the front end of the cylinder is connected to the atmosphere. Thus, the piston 26 together with the shaft 28 is moved forwards.

**Rotation of claw unit**

For rotating the claw unit together with the log clamped between the claws the driver has to turn the handle 53, for instance towards the right-hand side. Thereby, the link 54 is lowered and the link 55 is raised. The first-mentioned link opens the valve 52 for starting the pneumatic motor 41 for clockwise rotation and the last-mentioned link operates the brake valve 56 to a position for discharging air under pressure from the brake cylinder 48 through the conduit 57 to the atmosphere. Now, the motor 41 is allowed to operate until the claw unit by the aid of the gearing comprising the gear ring 44 has reached the desired position of rotation. Then, the handle 53 is operated in the opposite direction for closing the valve 52 and simultaneously supplying air under pressure to the brake cylinder 48.

**Lateral movement of claw unit**

For moving the claw unit laterally the entire cross-frame is moved along the transversal shaft 4 by operating the cylinder 6. For performing this movement the handle 21 is turned, for instance towards the right-hand side. Then, air under pressure from the chamber 59 will flow through the valve 20 and the conduit 13 to the
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right-hand side of the cylinder 6. As the piston 5 is immovable, the cylinder 6 together with the cross-frame and the means for gripping and rotating the claw unit as well as the log will move towards the right-hand side as long as the air under pressure is supplied to the cylinder.

At the same time as the handle 21 is moved from its central position to either side, the valve 20 opens a conduit 14 through the cross-frame to the atmosphere, whereby the brake normally locking the cylinder 6 in the position as set is released. When the lateral movement of the cross-frame to the desired position has been completed, the handle 21 is again moved back to the central position, whereby the supply of air under pressure to the cylinder 6 through conduit 18 is cut off, air under pressure now being supplied through the conduit 16 to the brake cylinder 14 for locking the cylinder 6 in the new lateral position as set.

For laterally moving the cross-frame towards the left-hand side the handle 21 is operated towards the left-hand side, air under pressure now being supplied through the valve 20 and the conduit 17 to the left-hand side of the cylinder 6.

Because the air is somewhat elastic and expansible the lateral movement would progress unequally if the damping 20, 22, 23 were not provided. Now, when the cylinder 6 together with the cross-frame is moved laterally, for instance towards the right-hand side, the oil present in the cylinder space on the left of the piston 11 in Fig. 9, will flow through the conduit 22 and the valve 23 to the cylinder space on the right of the piston 11. When the cylinder 6 is moved towards the left-hand side, the oil will of course flow in the opposite direction.

The velocity of the lateral movement of the cross-frame is dependent upon the section of the passage in the valve 23 and also upon the viscosity of the oil used.

I claim:

1. A log carriage comprising in combination, a mobile base frame, an operator’s seat on said base frame, a cross frame on said base frame and means mounting the cross frame for lateral shifting movement relative to the base frame, a cylindrical bearing housing carried by the cross frame and having its axis extending longitudinally of the base frame, a bracket means rotatably mounted in said bearing housing, log gripping claw means supported in said bracket means and including individual claws, means mounting the individual claws for movement toward and away from each other, said first mentioned pneumatically operated mechanism comprising a cylinder, a piston movable therein, a sleeve attached centrally of said cylindrical bearing housing and constituting an extension of the same, the said cylinder being mounted concentrically about said sleeve and supported by said housing, said piston being cylindrically and slidably between said cylinder and said cylinder, a centrally disposed piston rod connected with said piston and guided in said sleeve and said bracket means for operating the claws, a first pneumatically operated mechanism on the cross frame for moving the claws toward and away from one another, a second pneumatically operated mechanism on the cross frame for imparting rotary movement to said bracket means and thereby turning the claws as a unit, a pneumatically actuated brake mechanism operably associated with said second mentioned pneumatically operated mechanism for selectively and simultaneously actuating said pneumatically operated mechanism and engaging the associated brake unit for fixing the position of the claw unit, and control means common to said third mentioned pneumatically operated mechanism and the pneumatically actuated brake means associated therewith for selectively and simultaneously actuating said pneumatically operated mechanism and disengaging the associated brake means associated therewith for effecting lateral shifting movement of the unit and stopping the actuation of said third mentioned pneumatically operated mechanism and engaging the associated brake unit for fixing the claw unit in its adjusted position and means mounting the control means in accessible positions in front of the operator’s seat.

2. A log carriage comprising in combination, a mobile base frame, a cross frame on said base frame and means mounting the cross frame for lateral shifting movement relative to the base frame, a cylindrical bearing housing carried by the cross frame and having its axis extending longitudinally of the base frame, a bracket means rotatably mounted in said bearing housing, log gripping claw means supported in said bracket means and including individual claws, means mounting the individual claws for movement toward and away from each other, said first mentioned pneumatically operated mechanism comprising a cylinder, a piston movable therein, a sleeve attached centrally of said cylindrical bearing housing and constituting an extension of the same, the said cylinder being mounted concentrically about said sleeve and supported by said housing, said piston being cylindrically and slidably between said cylinder and said cylinder, a centrally disposed piston rod connected with said piston and guided in said sleeve and said bracket means for operating the claws, a first pneumatically operated mechanism on the cross frame for moving the claws toward and away from one another, a second pneumatically operated mechanism on the cross frame for imparting rotary movement to said bracket means and thereby turning the claws as a unit, a pneumatically actuated brake mechanism operably associated with said second mentioned pneumatically operated mechanism for selectively and simultaneously actuating said pneumatically operated mechanism and engaging the associated brake means for fixing the position of the claw unit, and control means common to said third mentioned pneumatically operated mechanism and disengaging the associated brake means associated therewith for selectively and simultaneously actuating said pneumatically operated mechanism and engaging the associated brake unit for fixing the claw unit in its adjusted position.

3. A log carriage comprising in combination, a mobile base frame, a cross frame on said base frame and means mounting the cross frame for lateral shifting movement relative to the base frame, a cylindrical bearing housing carried by the cross frame and having its axis extending longitudinally of the base frame, a bracket means rotatably mounted in said bearing housing, log gripping claw means supported in said bracket means and including individual claws, means mounting the individual claws.
for movement toward and away from each other, a first pneumatically operated mechanism on the cross frame for imparting rotary movement to said bracket means and thereby moving the claws as a unit, a pneumatically operated brake mechanism operably associated with said second mentioned pneumatically operated mechanism for normally fixing the same, an additional rod extending transversely of and supported in the base frame and embodied with said third mentioned pneumatically operated mechanism, a piston rod centrally thereof, an auxiliary cylinder supported by the cylinder of the second mentioned pneumatically operated mechanism and enclosing said last mentioned piston in sliding relation, a shunt conduit connecting both ends of said auxiliary cylinder, a regulating valve included in said shunt conduit, said auxiliary cylinder and the shunt conduit having oil therein for damping the speed of the lateral movement of the cross frame in accordance with the setting of the regulating valve, a third pneumatically operated mechanism for laterally shifting the cross frame and thereby moving the claws laterally as a unit, said third pneumatically operated mechanism comprising a cylinder and a piston, said cylinder supporting the cross frame and constituting a base portion of the same, a rod extending transversely of and supported in the base frame and extending through said cylinder, said piston being embodied with said rod centrally thereof, a pneumatically actuated brake mechanism operably associated with said third mentioned pneumatically operated mechanism for normally fixing the same, control means common to said second mentioned pneumatically operated mechanism and the pneumatically actuated brake means associated therewith for selectively and simultaneously actuating said pneumatically operated mechanism and disengaging the associated brake means for turning the claw unit to the same and simultaneously stopping said second mentioned pneumatically operated mechanism and engaging the brake mechanism for fixing the position of the claw unit, control means common to said third mentioned pneumatically operated mechanism and the pneumatically operated brake means associated therewith for selectively and simultaneously actuating said pneumatically operated mechanism and disengaging the brake means associated therewith for effecting lateral shifting movement of the unit and stopping the actuation of said third mentioned pneumatically operated mechanism and engaging the associated brake unit for fixing the claw unit in its adjusted position.

4. A log carriage as defined in and by claim 1, including a brake plate integral with the cylinder of the third mentioned pneumatically operated mechanism and the second mentioned pneumatically actuated brake mechanism comprising a brake cylinder supported by the base frame and extending at right angles to the cylinder of the third mentioned pneumatically operated mechanism and a piston slidably mounted in the brake cylinder and including an end projecting from said brake cylinder for engagement with said brake plate.

5. A log carriage as claimed in claim 1, and further including a tubular conduit carried by the base frame and adapted to be placed in communication with the source of air under pressure, a distributing chamber for distributing air under pressure carried by the cross frame, means providing communication between said tubular conduit and said distributor chamber, branch conduit means extending from said distributing chamber to said second pneumatically operated mechanism and to said third pneumatically operated mechanism, additional branch conduit means extending from said chamber to said third pneumatically operated mechanism and its associated pneumatically actuated brake means jointly controlling fluid flow from the chamber through the branch conduit means to the third mentioned pneumatically operated mechanism and its associated brake mechanism, a handle for said valve and both said handles being mounted in front of the operator's seat.

6. A log carriage as claimed in claim 5, in which said base frame has an operator's seat thereon rearwardly of said cross frame, said distributing chamber being mounted in front of said seat, the control means common to the second pneumatically operated mechanism and to said third pneumatically operated mechanism and brake including a valve controlling fluid flow from the said chamber to the pneumatically operated mechanism and another valve controlling fluid flow from the chamber to the pneumatically actuated brake mechanism, a single handle for controlling joint valves, the control means comprising said control means of said second pneumatically operated mechanism and its associated pneumatically actuated brake means jointly controlling fluid flow from the chamber through the branch conduit means to the third mentioned pneumatically operated mechanism and its associated brake mechanism, a handle for said valve and both said handles being mounted in front of the operator's seat.

7. A log carriage as claimed in claim 1, and further including a tubular conduit carried by the base frame and adapted to be placed in communication with the source of air under pressure, a distributing chamber for distributing air under pressure carried by the cross frame, means providing communication between said tubular conduit and said distributor chamber, branch conduit means extending from said distributing chamber to all said pneumatically operated mechanisms, additional branch conduit means extending from said chamber to said third pneumatically operated mechanism and its associated brake means, said control means controlling fluid flow through all said branch conduit means and an additional control means controlling the actuation of said first mentioned pneumatically operated mechanism, outlet conduit means mounted on said tubular conduit for delivering air under pressure to a point of utilization and valve means for controlling fluid flow through said outlet conduit means.

8. In a log carriage, a mobile base frame, a rod extending transversely of the base frame, a cross frame including a base portion for supporting the cross frame for shifting movement relative to the rod, a cylinder slidably embracing said rod and constituting the base portion of the cross frame, a piston means mounted on said rod centrally thereof and within said cylinder, log gripping claw unit means carried by said cross frame, conduit means communicating with opposite ends of the cylinder, control means operably associated with said conduit means for controlling supply and exhaust of fluid therefrom whereby said cross frame and thus said claw unit can be shifted laterally of the base frame in either direction, fluid pressure actuated brake means including a brake plate carried by said cylinder, a brake cylinder carried by said base frame, a brake piston slidably mounted therein and normally engaging said brake plate, conduit means communicating with said brake cylinder for supplying and exhausting fluid therefrom and said control means controlling fluid flow to said brake cylinder whereby said piston is normally applied to said brake plate to fix the position of the cylinder and thus the claw unit and responsive to actuation of the control means to shift the cylinder laterally of the base frame, said brake is disengaged and upon cessation of shifting movement said brake is re-engaged.

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